

Remarks

Reconsideration of the application and allowance of all pending claims are respectfully requested. Applicants respectfully request that the remarks concerning Maeurer and the newly cited art, D'Errico, be carefully considered. Claims 1-47 remain pending.

In the Office Action dated September 25, 2002, claims 1-42, 44, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeurer et al. (U.S. Patent No. 5,301,323) in view of D'Errico (U.S. Patent No. 6,434,637). Additionally, claims 43 and 45 are rejected under 35 U.S.C. 102(b) as being anticipated by Maeurer. Applicants respectfully, but most strenuously, traverse these rejections for the reasons below.

In one aspect of applicants' invention, the I/O configuration of a computing environment is dynamically changed (e.g., one or more channel paths are added and/or deleted) in order to move available channel resources to where they are needed or to remove excess channel resources, without human intervention. To achieve this, as one example, a channel path to be used in the dynamic adjusting is selected. The selection can take into consideration various characteristics, such as I/O velocity and/or others.

In one example, applicants claim a method of managing input/output (I/O) configurations of a computing environment (e.g., claim 1). The method includes, for instance, selecting a channel path from a plurality of channel paths to be used in adjusting an I/O configuration of the computing environment, the selecting being based, at least in part, on an I/O velocity resulting from selecting the channel path; and dynamically adjusting the I/O configuration using the selected channel path. Thus, in applicants' claimed invention, an I/O configuration is adjusted. That is, a channel path is added to the I/O configuration or deleted from the I/O configuration, as examples. Further, the channel path used to adjust the I/O configuration is selected based, at least in part, on I/O velocity. This is very different from the teachings of Maeurer and D'Errico, either alone or in combination.

Although Maeurer addresses dynamic channel path management, Maeurer does not take into consideration I/O velocity when making adjustments, but instead, makes adjustments based

on channel path utilization. This is explicitly stated in Maeurer. For example, at Col. 8, lines 32-35, Maeurer recites locating the CHPID with minimum utilization. Further, in Col. 9, lines 33-35, it states, "The CHPID with the most available utilization is always selected." Thus, Maeurer teaches the use of channel path utilization in selecting the channel path used to adjust an I/O configuration, and does not teach or suggest the use of I/O velocity in adjusting, as claimed by applicants.

D'Errico does not overcome the deficiencies of Maeurer. D'Errico is directed to balancing workload among current paths in a multipath computer system based on the state of previous I/O operations. That is, D'Errico uses the set of paths that it has and distributes work on those paths. D'Errico is not directed to adjusting or changing an I/O configuration. For example, D'Errico does not change the configuration by adding or deleting paths (as examples), but instead, the configuration in D'Errico stays the same and I/O operations are distributed on the current set of paths. In particular, D'Errico selects a path of a current set of paths to distribute an I/O operation thereon (see e.g., Abstract; Col. 14, lines 42-45). Thus, D'Errico is simply distributing I/O operations, and not adjusting an I/O configuration, as claimed by applicants.

Although D'Errico mentions that information collected by the host computer to determine which path of a plurality of current paths is to be used for the next I/O operation includes the average response times for particular types of I/O operations, for particular paths, and for particular target logical volumes, (Col. 14, lines 62-65), the use of this information is for the purpose of transmission on a current set of paths (Col. 14, lines 42-45), and not for the purpose of adjusting the I/O configuration. The I/O configuration in D'Errico stays the same; a path of that configuration is selected. Thus, D'Errico fails to teach or suggest one or more aspects of applicants' claimed invention in which I/O velocity is used, at least in part, to select a channel path to be used in adjusting an I/O configuration.

Further, the combination of Maeurer and D'Errico does not teach or suggest using I/O velocity, at least in part, in selecting a path to adjust the I/O configuration. At the very most, the combination teaches using I/O velocity to select a path of a set of current paths for transmission of a next I/O operation, and that other characteristics, other than I/O velocity, are used to select a path to adjust the I/O configuration. Thus, the combination of Maeurer and D'Errico fail to teach

or suggest applicants' claimed invention. Therefore, applicants respectfully submit that independent claim 1, as well as independent claims 14, 27 and 28 are patentable over Maeurer and D'Errico, either alone or in combination.

Additionally, the dependent claims are patentable for the same reasons as the independent claims, as well as for their own additional features. For example, dependent claim 41 indicates that the channel path used in the adjusting can be selected from a plurality of channel paths that includes both channel paths that can be added, as well as channel paths that can be deleted, and that the selecting concurrently takes into consideration the one or more paths that can be added and the one or more paths that can be deleted. This is not described, taught or suggested in Maeurer or D'Errico, either alone or in combination.

In Maeurer, the technique first tries to find a channel path to be added, and then only if no adds are possible, does it attempt to find a path to be deleted. It does not concurrently consider both the add and delete possibilities. Thus, Maeurer fails to teach or suggest one or more aspects of applicants' claimed invention.

Further, D'Errico does not overcome the deficiencies of Maeurer. Again, D'Errico does not describe the adjusting of an I/O configuration, and specifically does not describe adding or deleting a channel path. It simply describes using the current set of paths to transmit I/O operations thereon. In support of the rejection, the Office Action refers to Col. 4, lines 5-19 and Col. 9, line 45 – Col. 10, line 29 of D'Errico. However, a careful reading of these sections indicates that a path of a current set of paths is being used for transmission, and there is no teaching or suggestion of changing the I/O configuration by adding or deleting paths. Thus, D'Errico does not overcome the deficiencies of Maeurer. Based on the foregoing, applicants respectfully submit that dependent claim 41 is patentable over Maeurer and D'Errico, either alone or in combination.

In a further aspect of applicants' invention, applicants claim a method of managing input/output configurations of a computing environment (e.g., claim 43). The method includes, for instance, selecting a channel path from a plurality of channel paths to be used in adjusting an I/O configuration of the computing environment, the selecting being based on a plurality of

characteristics; and dynamically adjusting the I/O configuration using the selected channel path. Thus, in this aspect of applicants' claimed invention, the channel path is selected based on a plurality of characteristics. In just one example, the plurality of characteristics may include I/O velocity and complexity of the resulting I/O configuration.

In the Office Action, it is stated that the feature upon which applicants rely (i.e., I/O velocity) is not recited in the rejected claims. Applicants respectfully submit that they are not relying on this feature in claim 43, but instead, are relying on the feature that a plurality of characteristics is being used in selecting a channel path to be used in adjusting an I/O configuration. This is very different from the teachings of Maeurer.

In Maeurer, selection of the channel path is based solely on channel utilization. Thus, there is only one characteristic used in making the selection. This is in sharp contrast to applicants' claimed invention, in which a plurality of characteristics are used in making the selection. Thus, Maeurer does not anticipate, teach or suggest applicants' claimed invention.

Based on the foregoing, applicants respectfully submit that all pending claims are patentable over Maeurer and D'Errico, either alone or in combination. Thus, applicants respectfully request an indication of allowance for all pending claims.

Should the Examiner wish to discuss this case with applicants' attorney, please contact applicants' attorney at the below listed number.

Respectfully submitted,

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Dated: December 17, 2002

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PO9-99-158

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